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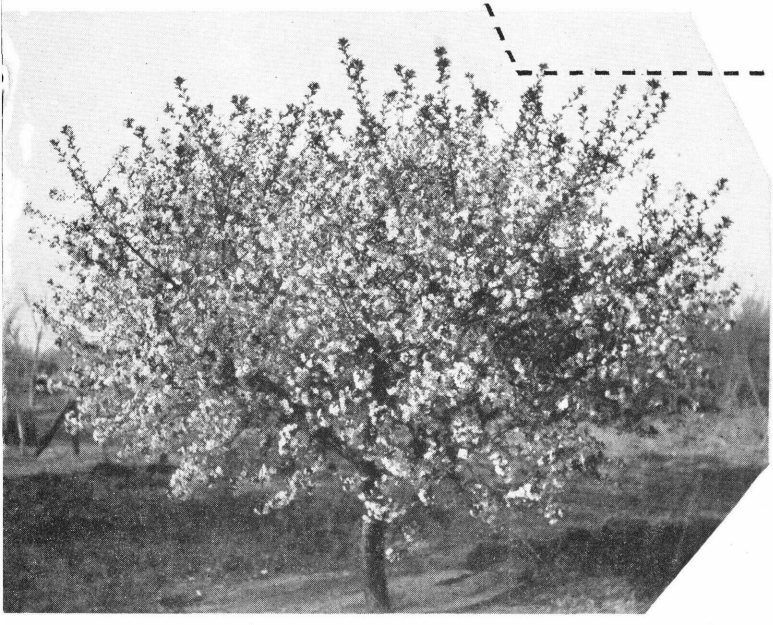
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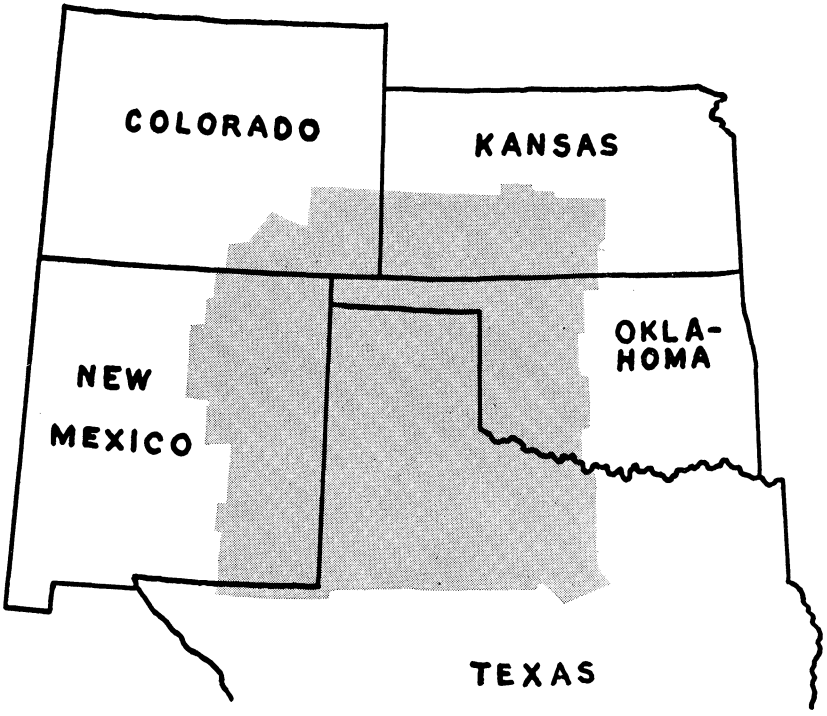
# GROWING *Fruits and Nuts*

## IN THE SOUTHERN GREAT PLAINS



**Farmers' Bulletin No. 2087**

U. S. DEPARTMENT OF AGRICULTURE




The area known as the southern Great Plains.

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Washington, D. C. Issued November 1955

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 15 cents

# GROWING *Fruits and Nuts* IN THE SOUTHERN GREAT PLAINS

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The part of the United States known as the southern Great Plains consists of southeastern Colorado, southwestern Kansas, western Oklahoma, eastern New Mexico, and the northern part of west Texas. The growing of fruits and nuts in this area is difficult because of drought, spring frosts, and other unfavorable climatic conditions. The experiment stations in the area receive many requests every year for information about the kinds of fruits and nuts most likely to succeed.

Fruit plantings in the area are limited to a few sections and there are not many sources from which to learn what varieties are adapted to the area as a whole. Fruit comes into bearing more slowly in this dry area than in more humid regions. After it comes into bearing, late frosts and droughts frequently injure or prevent development of the crop; therefore a longer time is required to determine the varieties best suited to the area. Experiments with fruits and nuts were begun in 1914 at the United States Southern Great Plains Field Station, Woodward, Okla., and since that time hundreds of varieties of tree and vine fruits have been tested.

## EFFECT OF CLIMATIC CONDITIONS ON FRUITS

Climatic conditions affecting fruit growing in this area change very gradually from place to place. The summer temperatures throughout the area differ very little, but the winter temperatures are markedly lower in the northern part and the frost-free period is much shorter, making it impossible to grow some of the types and varieties that succeed under more favorable conditions. (Fig. 1.)

The annual rainfall on the eastern edge of the plains is from 20 to 30 inches and diminishes to the west until in eastern New Mexico and southeastern Colorado it amounts to only 12 to 15 inches. The heaviest rainfall normally comes during the growing season, but severe droughts may occur at any time. Fruit trees often make good growth even in the most arid parts, but the fruit often does not set or it shrivels and drops off before maturity. Irrigation at critical times may save a crop or at least improve the quality of the fruit, especially in the western part, where the rainfall is lowest.



70266

FIGURE 1.—One of the hazards of fruit growing on the plains—a fruit tree covered with snow at blooming time.

The southern plains are noted for their high winds. The prevailing winds are from the south and southwest and consequently the trees are inclined to lean to the north and northeast. The only way to make fruit trees grow straight and have well-balanced branching is to protect them with windbreaks (figs. 2 and 3).

Since many of the severe windstorms come in early spring before the deciduous trees are fully leafed out, evergreens make the most effective windbreaks. However, trees other than evergreens, if properly planted, will do a great deal to protect orchards and vineyards and will attain sufficient size to become effective much more quickly than will conifers. Do not plant deciduous trees closer than 75 feet from the first orchard or vineyard row, as they have vigorously competitive root systems. A row or two of conifers inside of this will form a permanent windbreak.

## LOCATION OF ORCHARD

Orchard sites may be divided into two general classes—bottom lands and uplands. Bottom lands that are closely underlaid with hardpan are worthless for fruit growing; but those with deep open soil, and with water within 6 to 15 feet of the surface, are ideal from the standpoint of tree growth. Good subirrigated bottom lands within the plains area are very limited in extent. The danger of late spring frosts is somewhat greater on bottom land than on uplands, which have better air drainage. Bottom lands in the plains, however, are relatively less susceptible to frost damage than such lands in more wooded areas, where the cold air settles into sheltered pockets.



70267

FIGURE 2.—These apple trees, protected by a windbreak, show uniform growth.

Danger from frost is greater with earlier blooming fruits such as apricots, peaches, and some of the earlier blooming plums than with apples, sour cherries, and other later blooming fruits. The early blooming kinds, therefore, should be planted on the higher land, if at all.

The uplands may be divided into two general classes, sandy and "hard" lands, though there are all gradations between the two. Cherries seem rather indifferent as to soil, and most other kinds of fruit will do better in somewhat sandy soil. This is particularly true when there is a sandy surface that absorbs water readily, and a heavier, more fertile subsoil that has a good water-holding capacity.



70268

FIGURE 3.—A young apple orchard not protected by windbreak. The wind has caused the branches to grow away from the prevailing wind.

## IRRIGATION

In the eastern part of the region, where rainfall is more plentiful, irrigation or subirrigation is of less importance than farther west. In the western part, where there is no subirrigation, irrigation should be practiced wherever possible. Sometimes a dozen irrigated trees will yield more fruit and fruit of better quality than a much greater number that cannot be irrigated. There is usually a period during the winter when the soil is not frozen and the ground about a number of trees may be thoroughly soaked, thus making good use of a limited water supply.

## SIZE OF PLANTING

Most orchard or vineyard plantings in the southern plains are for home use only and should consist of kinds of fruit, discussed later, that succeed best here. Most farmers and city gardeners are not equipped to spray larger areas. A few trees and vines of best adapted fruits will often provide valuable fruit for the family, and if the crop fails the loss is not great.

Few locations in the southern Great Plains are suitable for fruit culture on a commercial scale, and at present there exist only a few successful commercial plantings of from 5 to 100 acres.

## AGE OF TREES TO PLANT

It is more economical and satisfactory to purchase trees with good, vigorous 1-year tops than to purchase older trees. They will cost less

than older and larger trees, will be easier to transplant and prune, and will recover more quickly from the transplanting. It is also easier to train younger trees into the proper form than it is to reshape older trees that have been improperly formed in the crowded nursery.

## TIME OF PLANTING

In the southern Great Plains, except in the southern part, late winter or early spring planting will usually be most satisfactory. Plant the trees as soon as the severe winter temperatures are over, otherwise the tops stimulated by the warm air are likely to start growing before the roots make sufficient growth to support them. Fall planting has been less successful, particularly if the following winter is cold and dry, than late winter planting. Water the trees thoroughly as soon as they are planted, to settle the soil about the roots, even though there is plenty of moisture in the soil.

## PLANTING DISTANCES

The following distances between plantings are suggested:

| Kind of planting: | *Feet* |
|---|---|
| Pecans and black walnuts on bottom land | 50 to 60 |
| Apples and crabapples | 35 to 40 |
| Apricots, peaches, and pears | 25 to 30 |
| Cherries, jujubes, persimmons, and plums | 20 to 25 |
| Serviceberries and grapes | 10 to 15 |
| Blackberries, currants, dewberries, and raspberries | 4 to 5 |
| Strawberries: | |
| Plants | 1.5 to 2 |
| Rows | 3 to 4 |

## CULTIVATION, INTERCROPPING, AND MANURES

Clean cultivation should be practiced in a fruit garden or orchard to keep down weed growth and conserve moisture. It should be frequent enough to destroy weeds before they have made much growth, and so conserve moisture. If the slope of the land justifies it, make the rows on the contour and cultivate in such a manner as to prevent the soil from blowing and to avert or reduce runoff during rains. Local soil-conservation-service units will usually assist or advise on individual farms.

Fruit plantings can usually be arranged so that the same tools used for general crops can be used in the orchard.

There is often a great temptation to plant crops between the rows of fruit trees, especially when they are small. If this is done, particularly on land that is not irrigated or subirrigated, the intercrop should be at least 10 feet from the trees, and the ground between should be cultivated to save all available moisture for the trees. The temptation to interplant crops in old and established orchards is not so great, as the trees take up most of the moisture.

Under usual conditions in the plains it is not advisable to plant any crop in an orchard with the expectation of allowing it to grow to maturity or to provide much green manure. Fruit crops will benefit far more from the moisture used by the green manure crops than from the green manure crops themselves. Soils that are subject to blowing may be protected by planting wheat or rye early in the fall. Cultivate

to kill out the grain early in the spring before it robs the trees of moisture.

Stalks, litter, and manure scattered over sandy soil help prevent its blowing and improve the water penetration as well as enrich the soil. On heavier lands under dryland conditions, barnyard manure must be used with caution, as it may force growth which will scorch during hot, dry weather. On very sandy soils manure may be used more liberally. Do not put manure in the holes when planting trees. This practice frequently kills young trees.

## TRAINING AND PRUNING

Proper training and pruning are of great importance. Neglect or delay in training and pruning is one of the most common faults of the beginner. Pruning and training should be started as soon as the trees are set out. It may be impossible to shape them properly later.

Some of the objectives to be accomplished by pruning are:

(1) To balance the tops of newly set out plants with their reduced root systems.

(2) To obtain the proper framework and avoid bad crotches which may later split and ruin the tree.

(3) To shape plants so that fruit will be well distributed rather than crowded in some places and thin in others.

(4) To eliminate excess wood so that as much of the energy of the plants as possible can go into fruit production.

(5) To keep limbs from interfering with and injuring one another.

(6) To place the fruit so that the sunlight strikes it and ripens it evenly.

(7) To form plants, especially trees, so that they have strength to resist storms and will not break with heavy crops of fruit.

(8) To form plants that can be easily and effectively sprayed.

(9) To place the fruit so that it is more easily picked.

Pruning should be started as soon as the plants are set out and should be continued annually throughout the life of the plants.

## DISEASES AND INSECTS

Because of the dry climate of the plains, especially in the western part, diseases are not so serious as in more humid climates. The greater distance between orchards also slows up the spread of diseases. However, you should always be on the lookout for diseases. Send specimens to your State experiment station, and ask for information about anything unusual that you do not understand. This procedure may prevent serious losses.

As with diseases, insects may appear more slowly in the orchards scattered over the plains than where the orchards are closer together; however, insects are more serious than diseases. Even if an orchard is far away from others and is reasonably free from insects when first planted, it may become infested sooner or later.

## SPRAYING

Thorough spraying or dusting for control of insects and diseases is necessary for most tree fruits. The longer the growing season of the fruit, the more necessary it is. For example, 2 or 3 sprayings might be sufficient to keep summer apples fairly free from insects and diseases, while double that number would be necessary for late apples. Effectiveness depends in large part on making the applications at the correct time. The exact time will vary in different localities and in the same locality in different years, depending on climatic and other conditions. Definite instructions and recommendations may be had on request to the United States Department of Agriculture, the State experiment stations, or extension services. It is impossible in a publication of this kind to give detailed instructions for spraying. Ask the county agents for exact information on what sprays or dusts to use, and the proper time to use them on the types of fruit you are growing.

If the owner of a small orchard is not able to afford power equipment, a small power sprayer might be purchased and used cooperatively by a group.

Effective spraying or dusting can be accomplished with a hand outfit if the work is done with extreme care and thoroughness. For the small grower some of the all-purpose sprays or dusts for controlling both insects and diseases might be most useful.

## KINDS AND VARIETIES OF FRUITS AND NUTS

The following recommendations on varieties of fruit to grow in the southern Great Plains are based on experimental results at the Southern Great Plains Field Station and on the experience of nurserymen, practical growers, various experiment stations located within and near this area, and the State extension services.

The ripening dates given for the various fruits are, in most cases, those for the vicinity of Woodward, Okla. The season of ripening would be somewhat earlier farther south and later farther north. Higher altitude has the same effect as a more northerly location, so at higher altitudes farther west the season of ripening would be somewhat later.

### Apples

On the comparatively small areas of bottom land in the southern Great Plains where water is from 6 to 15 feet from the surface and there is no hardpan, apples should be the most successful fruit crop. In such locations the trees make rapid and healthy growth and bear with reasonable regularity (figs. 4 and 5). In the high, dry sections without irrigation many trees will not survive the first few years. Apples may be grown successfully under irrigation.

The following varieties of apples, listed in the approximate order of ripening, are suggested for planting in the southern Plains:

**Yellow Transparent.** Best early apple; tree medium to small, subject to blight, but vigorous and hardy; fruit yellow, small to medium in size, good for cooking, does not keep well, ripens in July.

**Wilson Redjune.** Tree vigorous, large; fruit medium to large, cone shaped, solid, red, flesh white and crisp; does well in the southern part of this area.



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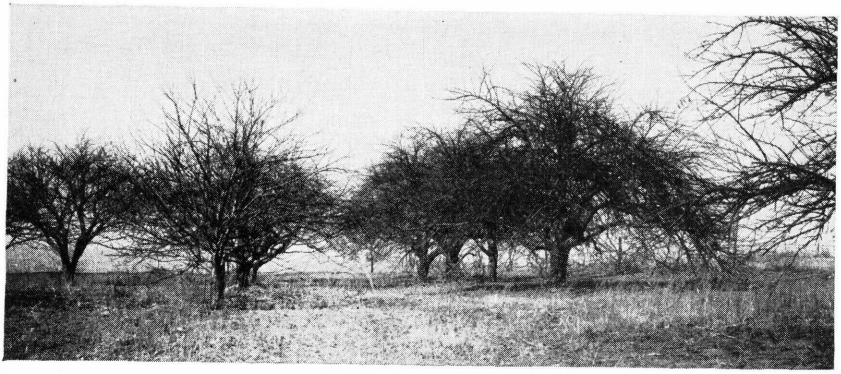
FIGURE 4.—An old but well-kept orchard on subirrigated land.

**San Jacinto.** Tree vigorous and productive; fruit medium size, red, similar to Wilson Redjune and may be identical with it; does well in the southern part of the area.

**Helm.** Fruit medium to large, handsome, with red skin and tender juicy flesh; ripens over a period of several weeks; suggested for limited trial for home use, particularly in the southern part of the area.

**King David.** Hardy, productive, and vigorous; fruit is about the size of a Jonathan but better colored; flesh is firm, crisp, tender, and juicy; ripens about the same time as Jonathan.

**Kinnard.** Fruit Winesap type but ripens somewhat earlier. Has distinctive, agreeable flavor; well worthy of trial.



70270

FIGURE 5.—An apple orchard in which both cultivation and pruning have been neglected.

**Golden Delicious.** Tree vigorous, hardy, and productive; fruit large, golden yellow; skin thin and strong; quality good; shrivels in storage; ripens late in September; not thoroughly tested in this section but well worthy of trial for home orchard. Much of the fruit is borne on long slender branches that are susceptible to wind damage.

**Stayman Winesap.** Fruit larger and better flavored than Winesap; ripens late in fall; probably not as well adapted as Winesap to this section as it cracks badly when the usual summer drought is broken by fall rains.

**Turley.** Similar in many respects to Stayman and is often substituted because of less danger of cracking.

**Winesap.** Tree medium size, vigorous, productive; fruit medium to large, deep red; ripens late in fall; one of the most widely grown apples in southern half of the United States, and one of the best for market and general purposes.

There are a number of bud sports of red apples. The principal difference is redder color, which makes the fruit more attractive. Other characteristics are the same. It is usually more desirable to use these bud sports than the parent varieties.

## Crabapples

Crabapples are somewhat more vigorous and will perhaps stand more abuse than other types of apples. Their principal use is for jellies and sweet pickles.

**Florence.** Tree vigorous, trunk upright, small branches drooping, very prolific; fruit medium to small, yellowish white, overspread with red; flesh yellow, coarse, tender, and juicy; quality fair to good (fig. 6).



70271

FIGURE 6.—A young Florence crabapple tree with a heavy crop.

**Whitney.** Tree medium size; fruit large for a crabapple, light yellow striped with red; flesh yellow, crisp, juicy, of good quality. This variety is excellent for sweet pickles and is good to eat out of hand.

The **Transcendent** crabapple is also probably worthy of trial.

### Pears

Pears, which were found in almost every orchard and in many back yards 35 or more years ago, have almost died out with the exception of one variety—the Kieffer. This is due to the prevalence of fireblight, to which the Kieffer is more resistant. Pears, except blight-resistant varieties, should probably not be planted in the southern Great Plains area, as the nonresistant varieties are likely to be a continual source of trouble in the average home orchard.

**Kieffer.** This is a large pear. It is good for canning and other culinary purposes, but of poor quality for eating out of hand. The tree is one of the healthiest and hardiest of all pear trees. It is not self-fertile and will not bear unless some other variety, such as Garber, is planted near it. Plant 1 tree of Garber for every 10 Kieffer trees to furnish pollen for fertilizing the Kieffer blossoms. Kieffer blooms early and so is subject to damage by frost.

**Douglas.** This is a hybrid, with Kieffer as one of the parents. The few trees that have been tried in this area have been consistent and heavy bearers. Where it succeeds, it comes into bearing early, and the trees prove healthy, hardy, and blight resistant. It is worthy of trial on a small scale.

**Garber.** This is similar to the Kieffer but is earlier, and is better for canning.

Some of the newer blight resistant varieties, such as **Waite, Orient,** and **Richard Peters,** resulting from various breeding programs may be worth planting on a small scale. Some of these, like Kieffer, are not self-fertile. They should be planted with other varieties for pollination.

### Sour Cherries

Sour cherries are one of the most reliable kinds of tree fruits for the southern Great Plains. Their blossoms are seldom killed by late spring frosts which so often keep peaches, apricots, and early blooming plums from producing crops. With reasonably clean cultivation they will grow and bear on the high, hard lands where apples will do nothing. The trees may be short-lived in some localities and need to be replaced after a few years. They will probably do best on naturally subirrigated land, with water at a depth of 10 to 15 feet, but do not seem to prosper where water is closer to the surface. Birds prefer mulberries to cherries, hence a mulberry windbreak is very helpful. Such a windbreak should be at least 70 feet away from the cherry trees, so that it will not rob them of moisture.

The varieties of sour cherries best adapted to this area are given in order of ripening:

**Dyehouse.** Ripens a week earlier than Early Richmond, has good quality and better color, but fruit is slightly smaller; trees more sensitive to environment and bear less freely than Early Richmond.

**Early Richmond.** The leading early sour cherry; tree vigorous and prolific; ripens early but lacks the size and quality of the Montmorency.

**Montmorency.** Most widely grown and popular sour cherry in the United States; stands handling and shipping well; ripens midseason. Some selections of this variety are reported to be superior to others.

**English Morello.** Tree small and vigorous, but subject to disease and short-lived; fruit late and very sour but of good quality for cooking; the best late cherry.

The varieties of sour cherries named above are all recommended, because they succeed each other in ripening and so extend the ripening season. Where only one variety is to be planted most people will prefer Montmorency.

### Sweet Cherries

The varieties of sweet cherries tested have not proved adapted to plains conditions.

### Duke Cherries

The several members of this group are supposed to be hybrids from sweet and sour cherries. They have a wider adaption than the sweet cherries but have not done as well in this area as the sour cherries. However, the Royal Duke is reported to have done well on the experiment station at Lubbock, Tex. They should have pollenizers.

### Peaches

Peaches bear often enough in the southern Great Plains to encourage people to plant them. Because of late frosts in the spring, peaches can be expected to bear a good, full crop only 1 year in 4 or 5, and there is a possibility that drought or hail may injure or destroy even this one crop. There may also be one or more partial crops during this time. Experience indicates that complete failures may vary from 1 or 2 to occasionally as many as 4 in a 5-year period.

Peach trees are one of the most vigorous and rapid growing of all fruit trees on high, dry land, where they should be planted to avoid as much frost damage as possible. A few peach trees are well worth planting because of the value for home use of the occasional crops. Peaches are likely to do best on soil that is not too heavy (fig. 7).

Peach trees are short-lived, and new trees should be planted periodically. Treat them occasionally for root borers. Time of treatment is important; ask your county agent or State extension service for detailed instructions.

Differences between varieties in hardiness of buds and flowers and in time of blooming are so slight that no variety is outstanding. Nevertheless, in an occasional season and in some localities there may be striking differences in these respects. Some of the better varieties at the U. S. Southern Great Plains Field Station, Woodward, Okla., are:

**Mayflower.** Tree large, productive; fruit medium size, cling, skin creamy white with dark red cheek, fuzzy; flesh greenish white, red near skin; quality fair to good; ripens middle of June.



70272

FIGURE 7.—A well-formed, vigorous young peach tree growing in sandy soil.

**Japan Dwarf (Japan Dream or Japan Blood Dwarf).** Tree small, strong, productive; fruit medium size; skin dark red, fuzzy; flesh dark red, firm, subacid, practically freestone; appearance not attractive; a few should be planted for home use; ripens late June to early July.

**Arp (Arp Beauty).** This is one of the earliest good yellow peaches; tree large and vigorous; fruit creamy yellow blushed with red; good quality, cling; its season a month to 5 weeks earlier than that of Elberta. This variety is slightly more hardy in late freezes while in the bud than many of the other varieties.

**Carman.** Tree large, productive, and adaptable to trying soils and climates; fruit medium size, juicy, mild, sweet, nearly freestone; skin brilliant red on creamy white, unusually attractive; flesh white, red at center; ripens middle of July to early August.

**Champion.** Tree large, vigorous, productive; fruit medium size, creamy white with red blush, freestone or nearly so, quality very good; skin tough, sticks to flesh; flesh white, red at center; ripens forepart of August.

**Culbertson Champion.** A bud sport of Champion originating on a farm in Woodward County, Okla.; a white peach similar to Champion except that it ripens at least 4 weeks earlier and, at least in some locations, is much more productive; ripens forepart of July; a good, early peach.

**Belle (Belle of Georgia).** Fruit large, creamy white, with red cheek, smooth, freestone; a most attractive peach, bears well and is much grown throughout the South; ripens forepart of August.

**Elberta.** Most widely grown peach in America; fruit large, deep yellow, with red cheeks, freestone; flesh golden yellow, red at pit, firm,

fine, tender; quality for table use medium, but for cooking and canning excellent; ripens middle to late August. This variety is somewhat more susceptible to freezing than many others.

**Other Varieties.** There are many new varieties of peaches that have been produced as chance seedlings, or as the result of organized breeding work by various experiment stations. Some of these are reported to be of especially good quality, others are supposed to be more hardy. Those tested at Woodward were no hardier than the usual varieties.

Some of the newer varieties that are reported to be doing well at points in central Oklahoma and northern Texas but east of the plains are: Dixired, Dixigem, Redhaven, Golden Jubilee, Triogem, Hale Haven, and Frank. Any of these are worth trying on a small scale in this area. Frank is the only one of the group that has been tested at Woodward and it did only fairly well.

### Plums and Plum Hybrids

There are a multitude of plums, but probably only a few varieties will succeed in the southern plains. Not enough tests have been made to determine definitely which varieties will succeed. There are three distinct groups—American, Japanese, and European—and under each group there are a number of subgroups and varieties. In addition, there are many hybrids.

The American varieties are native and are more likely to succeed than the others. The yields are often high, but the fruit is usually smaller than that of the other groups. Fruits of the American varieties are principally useful for jellies, jams, canning, and other culinary purposes. The trees are often bushy and irregular and hard to control by pruning. The Wild Goose, Wolf, and Wyant are representative American varieties. Sometimes a wild seedling may be found that will bear abundant fruit of fair quality.

The European varieties produce large plums and prunes, and are often shipped to this area from California and the Northwest. Many of the varieties are subject to disease, and the prevailing opinion seems to be that they will bear only light crops under dryland conditions. None of the few varieties tested at Woodward have proved satisfactory.

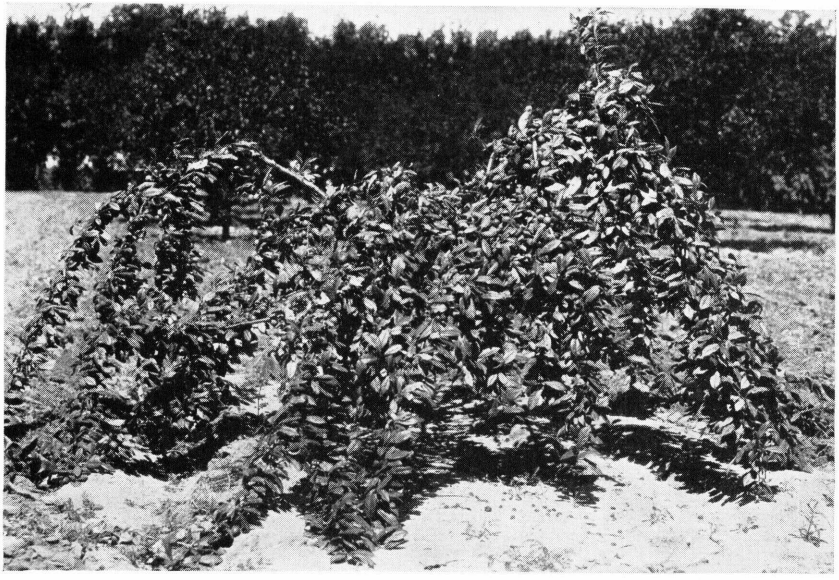
The Japanese varieties and many of their hybrids have the outstanding fault of blooming so early that they are caught by frost as often as or more often than peaches. Their fruit is larger and showier than that of American varieties. The Abundance and Burbank, representing this group, will bear only occasional crops in the Woodward area.

Many hybrids have been developed by crossing American and Japanese varieties. Some of them are very good, and it is probable that in the future one or more of them will be preferred to others. The America, Gold, and Omaha are among the best of the Japanese × American crosses for this section.

Hybrids developed by crossing the sandcherry (*Prunus besseyi*) with the American and Japanese varieties of plums are now attracting wide and favorable attention. The trees are usually small and often bushy but in general are well shaped. They are free of thorns. The

fruit grows thickly along the past season's growth of wood and is easy to gather. The flavor varies greatly with varieties, but the flesh is firm and the quality fair to good. Yields are usually high, though not as certain as those of the sour cherry. New varieties are rapidly being introduced, and some of them may eventually prove favorites. Of the older varieties that have been more thoroughly tested, the following are recommended for trial:

**Opata.** A cross between the sandcherry and the Golden Plum, made by Dr. N. E. Hansen, is one of the more widely used of the Hansen hybrids. It often comes into bearing the next year after planting. The fruit is of good quality, 1 to 1½ inches in diameter with green flesh, good for eating out of hand, and for canning (fig. 8).



70274

FIGURE 8.—A young Opata plum showing bushy growth. The limbs are bent by heavy crop.

**Sapa.** Similar in size and fruiting qualities to the Opata. The fruit, however, has a rich dark purple skin, flesh, and juice.

Both the Opata and the Sapa are small and bushlike in growth, come into bearing early, fruit heavily, and are inclined to be short-lived. They are probably the two most successful varieties of plums grown in the southern Great Plains. Both are worth planting, but new plantings must be made occasionally.

**Compass.** This variety, a plum × sandcherry hybrid, is somewhat smaller than the varieties just mentioned, but it is older and better known. It is inferior both in quality and yield to the newer varieties. However, it makes heavy yields and is well worth planting to add variety.

**Culbertson.** A recent introduction originating on a farm in Woodward County, Okla. Tree vigorous and upright, fruit medium to large, red with yellow flesh, good quality.

## Apricots

In many places a few apricot trees are all that remain to indicate the locations of small orchards planted 30 to 50 years ago. Apricots bear so rarely in the plains that they are hardly worth planting as fruit trees. They make low wide heads sufficiently dense for excellent shade, and they are well worth planting for this purpose in places where height is not desired. Also, the bloom in the spring is attractive.

Although apricot trees are not likely to produce fruit more than once or twice in 10 years, the fruit is of high quality and the occasional crops will be very welcome. Plant varieties that bear the best fruit. Cluster, Early Golden, Moorpark, Royal, Superb, and Toyahvale are suggested.

## Jujubes

The jujube, or Chinese date, has been grown at the Southern Great Plains Field Station since 1924, and at most of the other experiment stations in the southern Great Plains for about the same length of time.

The jujube bears regularly. One variety, the Lang, has produced fruit every year since the year it was planted at Woodward. The other varieties did not come into bearing as early but have been equally regular in fruiting. No experiment station in the southern plains has reported failure in fruiting. The jujube even produced some fruit at Dalhart, Tex., during the dust bowl years. The jujube starts to bloom at Woodward about the middle of May or later, and continues to bloom over a period of several weeks. Blossoms and fruit are never injured by late spring frosts.

The jujube tree grows upright. It is very ornamental especially when laden with ripe fruit, which is a glistening russet brown; the leaves are smooth, glossy, and dark green. It is said not to be particular as to soils, doing well on either sandy uplands or alkaline bottoms, but it bears better on sandy soils than on heavy soils. Although jujubes do well under dryland conditions, irrigation improves both the size and quality of the fruit.

All the varieties ripen in late September and October. Neither the fruit nor the foliage appears to be injured by the first light frosts, and the frosts seem to hurry the ripening of the late-set fruit. The jujube has been remarkably free from attacks by insects and diseases. Borers attack young trees, as they do young trees of almost any kind.

The fruit is unlike any other grown in the southern Great Plains area. It is dry, pithy, and light in weight and has a sweet, pleasing, nutty flavor. It is little eaten out of hand except by children who like it very well. Its chief uses are as sweet pickles, preserves, dried confections, and fruit butter. Jujube butter is a pleasing addition to ice cream. The food value of the jujube is high and as the fruit becomes better known and more widely planted it should be a welcome addition to the limited fruit crops of the southern plains. All fruit plantings should include one or more jujube trees.

Numerous varieties of jujubes are handled by nurseries, but the following three are representative and probably as good as any:

**Sui men.** The fruit is much like a date in shape and size. It begins to ripen slightly earlier than the Li and the Lang, and is more highly flavored.

**Lang.** The fruit is pear shaped and somewhat smaller than that of the Li. At Woodward, Okla., the trees have grown more rapidly than those of the other varieties and have borne fruit the first or second year. Li and Sui men often do not bear until the third or fourth year after planting. Lang is, therefore, probably the best variety to plant, as a first venture with this crop (figs. 9 and 10).

**Li.** This variety has the largest fruit of the three varieties and is the last to ripen. The fruit is nearly spherical with a diameter of about 2 inches. In some localities the Li has yielded more fruit than other varieties. The skin of the Li is inclined to crack and the fruit molds badly if the weather is rainy at ripening time. Occasionally the fruit may be almost worthless.

## Persimmons

There are many native persimmon groves scattered along the eastern edge of the plains. Some of these bear abundant crops of good fruit, others bear fruit of poor quality, and occasionally one bears little or no fruit.

A grove, to yield fruit, must contain both fruiting and pollen-bearing trees. If trees are all of the fruiting sort, wood from a pollen-bearing tree grafted to a few trees will overcome the barrenness. If trees are all pollen-bearing, or if they are fruiting trees with a poor quality of fruit, they may be improved by grafts from better varieties (figs. 11 and 12).

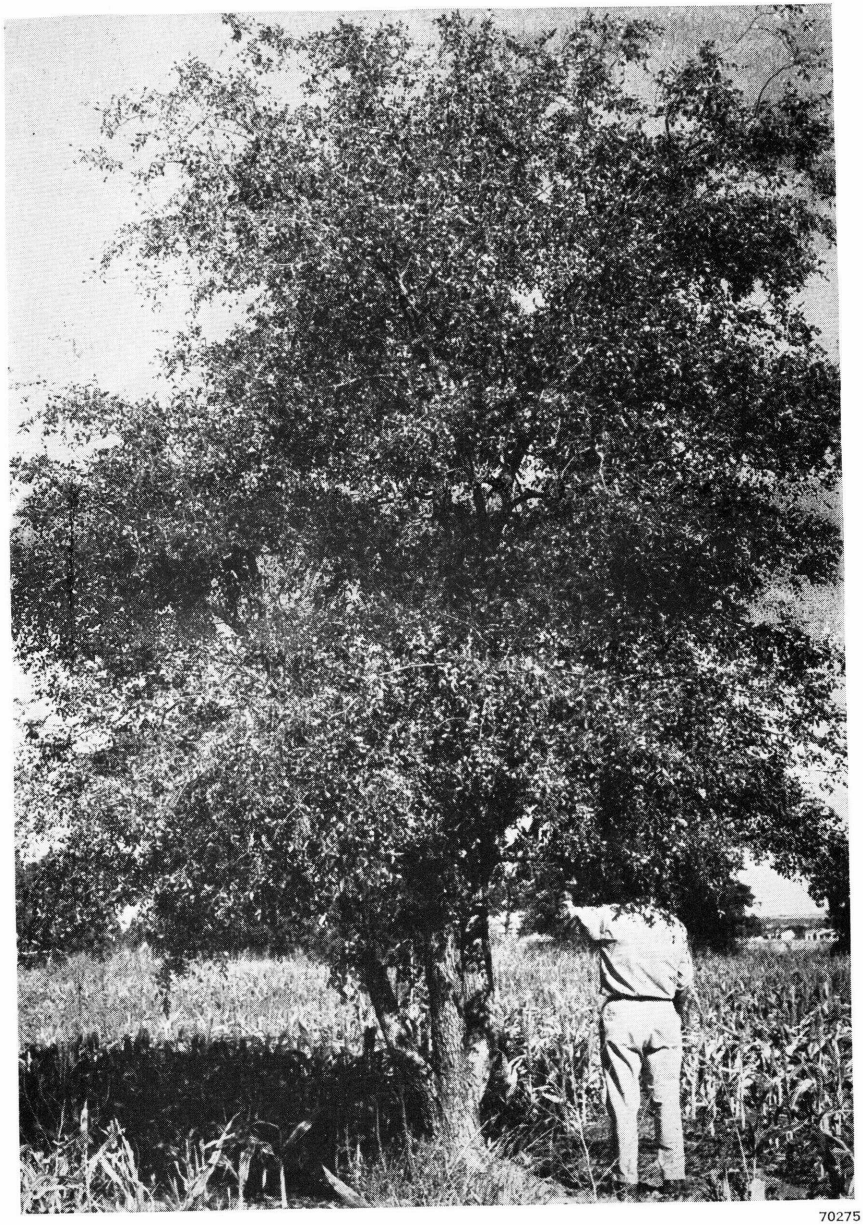
Perhaps the best variety of persimmon for the southern Great Plains is the Early Golden. It is 2 to 4 times the size of the average native persimmon, ripens before frost, and has flesh of fine texture and good flavor (fig. 13). It has a smooth skin and a very attractive reddish golden color. Other good varieties are Hicks, Iona Market, Josephine, and Garretson. Kawakami, a hybrid originating in northeastern Texas, has proved hardy at Woodward, Okla., but has produced only light crops.

Along the extreme southeastern edge of the plains some varieties of the Japanese persimmon may prove hardy enough to withstand the winter temperatures. The trees are small and ornamental, and the fruit is 2 to 3 inches in diameter. Some of the varieties handled by nurseries in the adjacent territory may be worthy of trial.

## Grapes

Grapes are one of the most reliable and successful fruits for the sandy soils over a large portion of the southern Great Plains. On the heavier soils most of the varieties do not do so well and many may fail (fig. 14). Grapes should be planted on sandy soils if possible.

A line drawn through Meade, Kans., Dalhart, Tex., and Tucumcari, N. Mex., divides the southern Great Plains into sections differing in suitability for grape varieties. North of this line most of them may often winterkill. Alpha and Beta varieties are the only ones suggested for trial in the area north of this line. Occasional late spring freezes may kill any of the varieties of grapes back to the ground,



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FIGURE 9.—A well-formed tree of Lang jujube with a heavy crop.

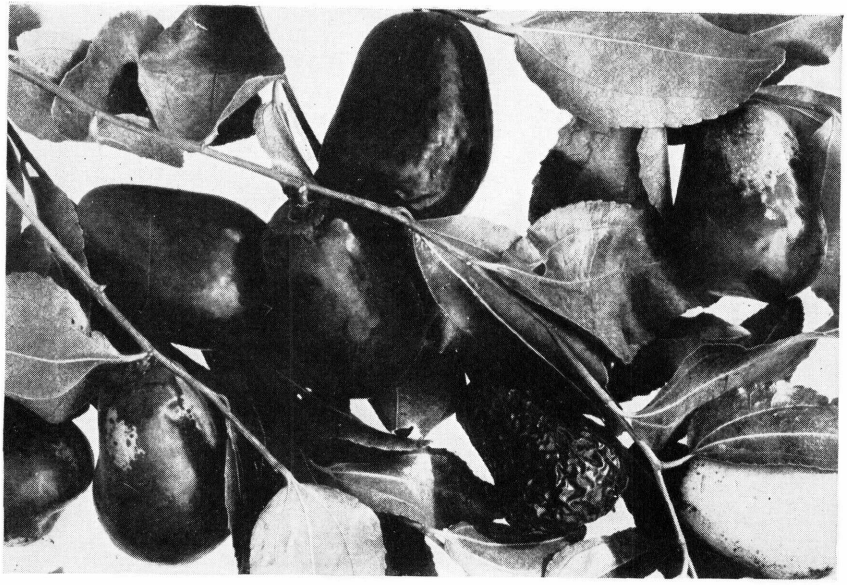


FIGURE 10.—Fruit of Lang jujube. (Courtesy of Dr. C. O. Erlanson.)

even in the southern part. If properly treated, however, this need not cause more than one season's loss of crop.

Only a few of the leading varieties and their most outstanding characteristics can be mentioned here. These are listed in the approximate order of ripening.

### VARIETIES FOR EASTERN AND SOUTHERN PORTIONS

**Beacon.** The fruit resembles Concord, but the berries are larger and the yields are much higher. It keeps well but does not stand rough handling as the berries shatter badly from the bunch. It is a good quality, general purpose grape for home use. Use—table and juice. (Fig. 15.)

**Caco.** Vigorous and productive, good quality, red grape, where it does well. At Tucumcari, N. Mex., it is one of the leading varieties. At Woodward, Okla., it usually shrivels and does not ripen properly in hot dry weather. Use—table.

**Extra.** Vigorous and apparently adapted to a wider range of conditions than any other variety listed here. It is worthy of trial on sandy soil throughout the area. At Lawton, Okla., this variety has done well on relatively heavy soil. At Woodward, Okla., it has not. This variety is now being grown rather extensively and is well liked in Wheeler County, Tex., where it is grown for local markets. Fruit medium size, black. Use—table and juice. (Fig. 16.)

**Carman.** Medium size, good quality black grape. Use—table and juice.

**Ellen Scott.** Vine vigorous, bears large, compact clusters of medium-sized, violet-colored grapes; quality of fruit excellent, especially on the drier western edge of the plains; inclined to black rot in more humid climates. Use—table and juice. (Fig. 17.)



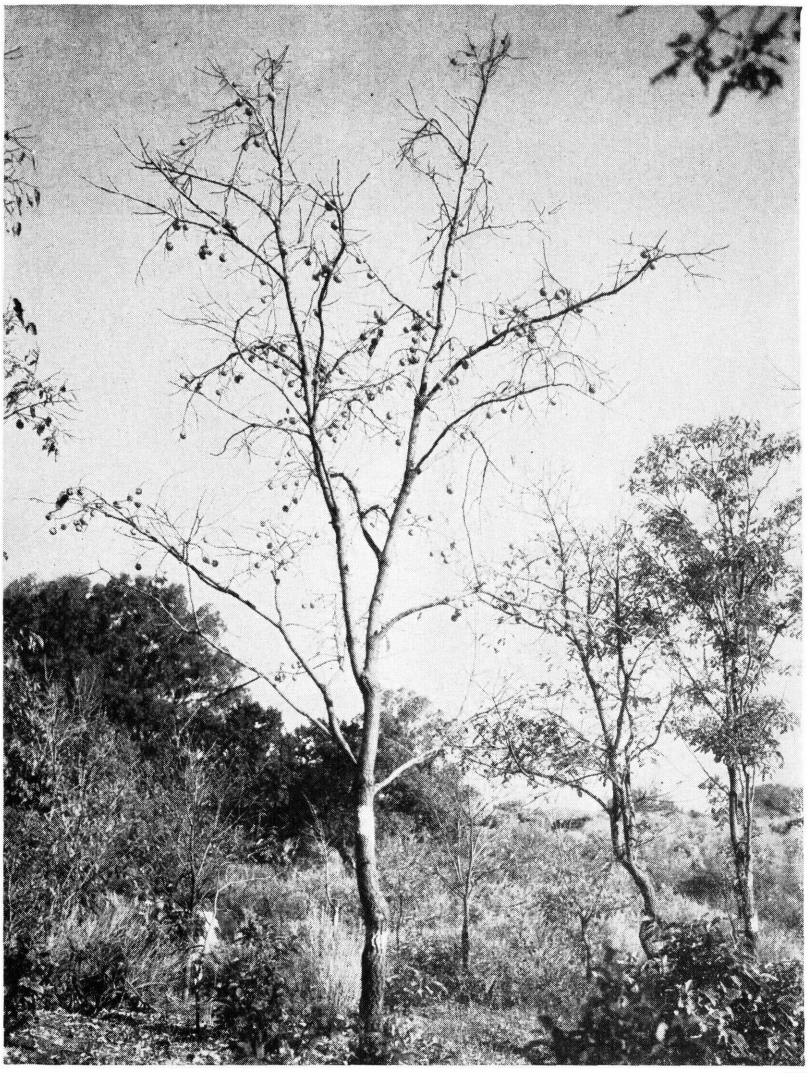
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FIGURE 11.—Top graft on a young persimmon tree after one season's growth.

**Armalaga.** A high quality, green grape; inclined to be somewhat tender. Use—table.

**Edna.** A vigorous, high yielding, green grape; quality not quite as high as Armalaga, but probably should be substituted for that variety on the western edge of the plains, where it seems to be better adapted. Edna should be planted near Carman, Armalaga, or Ellen Scott for pollination. Use—table.

**Catawba.** A medium-sized, red grape of high quality; worthy of trial on sandy soils over entire area. This is the only variety of



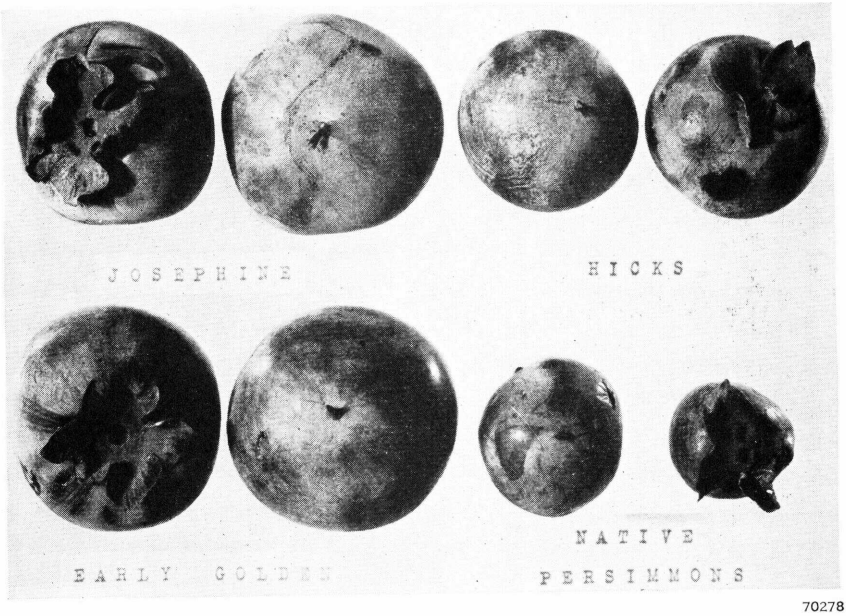
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FIGURE 12.—A native persimmon grafted with an improved variety—the graft is established and fruiting.

superior quality that has shown any promise as far north and west as Garden City, Kans. It ripens late and can be kept a long time in storage. Use—table and juice.

**Last Rose.** The vine grows with medium vigor, but it bears large, very compact clusters of fruit. Quality of fruit is not especially high, but this grape is worth planting, as it is the latest maturing in this list. Plant near Carman, Armalaga, Ellen Scott, or Extra for pollination. Use—table and juice.

**Concord.** Concord is not recommended. While it is one of the most widely known and generally planted varieties of grapes, it is



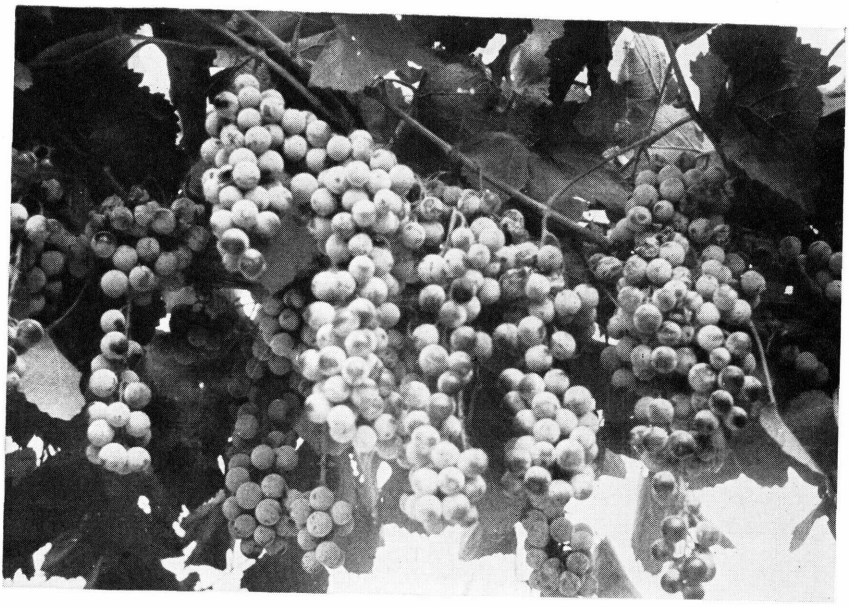

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FIGURE 13.—The size of three varieties of persimmons compared with that of local native persimmons.



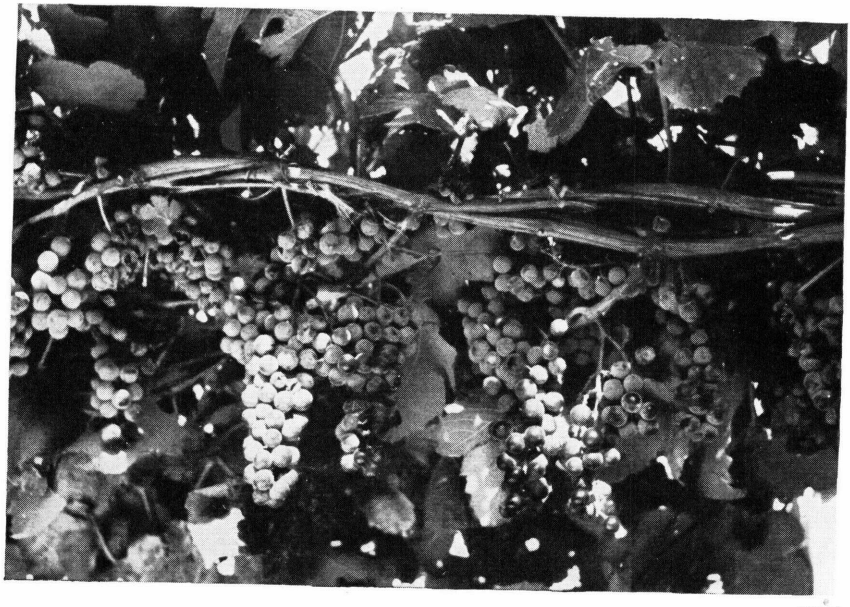
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FIGURE 14.—Experimental vineyard at the Southern Great Plains Station, Woodward, Okla.



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FIGURE 15.—A portion of a vine showing a good crop of Beacon.



70281

FIGURE 16.—A portion of a vine showing a good crop of Extra.



70282

FIGURE 17.—A portion of a vine showing a good crop of Ellen Scott.

entirely out of its territory in the southern Great Plains. It is not drought resistant, the fruit ripens unevenly, and it bears only light crops.

### VARIETIES FOR NORTHWEST PORTION

**Alpha and Beta.** These are two hardy northern grapes which are worthy of trial in the northwestern part of the southern Plains where the grapes listed above cannot be expected to succeed. These varieties are similar; both are blue and very early. Beta, in particular, has made good yields at Woodward, Okla. Both are poor in quality as compared with high quality grapes but are worth planting where other grapes are not likely to succeed. The Alpha is suggested as being a little better adapted to heavy black soils than the Beta.

## Bush Fruits

Blackberries and dewberries are the most successful of the bush fruits when grown on irrigated soil on the uplands or on subirrigated land in the bottoms, even though the soil may be distinctly alkaline. They are almost worthless in the drier portions of the southern Plains, on either sandy or hard lands, without some source of moisture other than the natural rainfall.

Dewberries are probably more in favor than blackberries, because many persons consider the quality of the fruit better. On the other hand, many consider blackberries easier to care for than the sprawling

dewberries. Preference for one or the other is less, however, when one has learned the management of both. If he plants both dewberries and blackberries, the home gardener also has a wider range of bush fruit varieties from which to select.

Of the thornless varieties tested, only the Thornless Young dewberry has proved to be worth planting; others tested have been unproductive or very tender. Even the Thornless Young is not fully hardy.

Anyone discovering a thornless plant of good fruiting qualities should carefully protect it and bring it to the attention of nurserymen and experiment stations, for it would be very valuable as a source from which to propagate.

### BLACKBERRIES

**Early Harvest.** Plants small, stiff, upright; fruit medium size, shining jet black, ships well, quality good; begins to ripen early, and ripens over a long period.

**McDonald.** A blackberry × dewberry hybrid of remarkable vigor. Plants grow upright with drooping canes, thus showing characteristics of both parents. Berries large, very black, quality excellent. It ripens early. One precaution is necessary in planting this variety; it is self-sterile, and it is absolutely necessary that some other variety of blackberry or dewberry, blooming at the same time, be planted near it to furnish pollen. Otherwise it will not bear fruit.

**Early Wonder.** The leading variety in the blackberry section of eastern Texas. It is productive; the berries are of medium size and good quality.

**Jordan.** A rather new and promising variety that ripens over a longer season than many others. Little is known about it except through limited tests and favorable comment from nurserymen and growers.

**Dallas.** This variety bears large, firm blackberries, which ripen in midseason. The plants are vigorous.

**Brainerd.** This is a variety originated by the United States Department of Agriculture and is suggested for trial in the South. It has not yet been tried at the southern Great Plains Field Station but it probably is worth trying on a small scale in the southern Plains. Because the fruit ripens late, irrigation probably will be essential most seasons.

### DEWBERRIES

**Lucretia.** This is one of the most vigorous and productive of the dewberries, and is capable of growing on a great diversity of soils. Berries large, though variable in size, jet black, quality very good when fully ripe.

**Mayes.** This is one of the most successful and widely grown dewberries over the Southwest. Berries large, too soft to ship well, but handsome and of good quality; ripen before Lucretia.

**Youngberry and Boysenberry.** These berries have not been fully tested in the southern Great Plains but under ordinary conditions cannot be expected to do well. Under favorable conditions they may be worthy of trial on a small scale for home use. Where they succeed, they are superior to the other varieties of dewberries.

## RASPBERRIES

Raspberries are grown very little over the southern Great Plains. However, they bear light to medium crops under favorable conditions and are so highly prized as a table delicacy that they are worth trying on a small scale in the home garden. They are more likely to succeed in the higher altitudes in the northern and western part of the area. When more work has been done with new varieties, new cultural methods, and better control of disease, raspberries may be a more dependable crop. At present the following varieties are suggested as probably better suited than others:

**Cumberland.** Black; one of the oldest varieties; fruit large and of good quality.

**Plum Farmer.** Black; one of the best varieties; vines vigorous; fruit large and of high quality.

**Ranere.** Red; small fruited; one of the "everbearing" sorts, having two principal fruiting periods.

**Sunrise.** Red; a cross of Ranere and Latham which is larger and earlier than Ranere.

**Cardinal.** Purple; known principally for the wide range of conditions under which it will grow; vine vigorous; fruit of medium size and good quality.

**Trailing Raspberry (*Rubus parvifolius*).** A native of Japan, Korea, and eastern China, this raspberry was first introduced into the United States in 1929 by the United States Department of Agriculture. The fruit is very glossy and has an attractive dark-red color; it has large size and only fair flavor. In general appearance the fruit resembles that of the darker-fruited strains of dewberries.

Trailing raspberry is not too particular about soil fertility and will grow on a wide range of soils east of the 24-inch-rainfall line. For initial plantings as a soil conservation plant, some form of cultivation is advisable for at least 2 years in order for it to compete successfully with other vegetation. The plant is moderately tolerant of shade and will grow underneath and along the edges of tree and shrub rows. Established plantings provide excellent ground cover and are especially useful in wildlife areas to provide nesting and feeding places for birds and small game. The fruit is of acceptable quality and is suitable for making pie, jelly, jam, tarts, and fresh desserts. The plant is resistant to bramble diseases and is not greatly damaged by insects and rodents. New plants may be obtained from seed or by covering cane tips with soil in midsummer. Best uses are for fruit, soil binding on back slopes of farm ponds, gully control, and as a low plant in wildlife plantings.

## CURRANTS

The golden currant (*Ribes odoratum*), commonly known as the wild black currant and native along the eastern edge of the plains, was grown by many of the early settlers. Lately it has undeservedly become neglected, for it will grow over the entire area and bears heavy crops of fruit. Since it spreads by root suckers that may be transplanted, an extensive hedge may soon be obtained. In the spring the yellow blossoms are showy and fragile; later on it makes an excellent shelter for chickens.

The only thing that usually needs to be done, in addition to cultivating the golden currant, is to destroy the tent caterpillars that infest it in the early spring. Spray or dust with arsenate of lead when the colonies are small or remove and burn the branches harboring the tent caterpillars.

### GOOSEBERRIES

Gooseberries are not so popular as many of the other bush fruits and have not been so widely planted. They probably will succeed only with irrigation, and are more likely to succeed in the northern than in the southern part of the area. The Glendale gooseberry is suggested for trial.

### JUNEBERRIES (SHADBUSH)

The Juneberry usually handled by western nurserymen is *Amelanchier canadensis*. It will grow from 12 to 25 feet high. It sprouts from the roots and will make a thick attractive hedge. The currant-like fruit, which is about the size of the golden currant, is sweet and rather flat but it is often borne in quantities. Good use can be made of it for jellies and similar purposes.

The dwarf Juneberry (*A. stolonifera*) grows only 3 to 4 feet high and bears heavier crops of better quality than *A. canadensis*, but it has been tested very little on the southern plains.

### STRAWBERRIES

Strawberries are grown very little in the southern Great Plains and cannot be raised successfully without irrigation. As they are very shallow rooted, irrigation is often applied more economically and effectively by an overhead sprinkling system or by shallow subirrigation. Mulching with straw helps to retain moisture, prevent weed growth, and keep the berries clean.

Strawberry growers usually like to try out many varieties until they find the ones suited to their fancy or to their particular conditions. The prospective grower should start with the assumption that great patience is required until knowledge is gained through experience. In this area more people fail than succeed with strawberries. The following varieties are suggested:

**Mastodon.** This everbearing variety has shown promise in some localities.

**Blakemore.** This is one of the strawberries most grown commercially throughout the South. Berries medium, firm, bright red; quality medium tart; ripens early.

**Aroma.** Vigorous and hardy; berries large, roundish, light red; firm; good shipper; medium in quality; largely grown over wide range of territory; ripens midseason to late.

**Dunlap.** Berries medium size, clear deep red, handsome; quality good. Grown almost exclusively for home use in many sections. Ripens midseason.

Numerous new varieties of strawberries have been produced during the last few years but have not been tested in this area. Some of these such as Sioux, Cheyenne, and Gem, may be well worth a trial.

## Nuts

A great many inquiries are received by the United States Department of Agriculture as to whether there are any nut trees that will succeed in the plains. In certain favorable locations, pecans and black walnuts can be grown successfully.

### PECANS

In the southeastern part of the southern Great Plains some of the papershell varieties of pecans can be grown successfully on bottom lands. It is practically useless to attempt to grow them on the high lands without irrigation. So few cultivated varieties have been grown, even on the bottom lands, that little is known about which varieties might be most successful. Probably most of the trees growing in the region, whether cultivated or native, bear nuts of inferior quality. They are often small and hard-shelled or do not fully ripen before frost. Persons interested might add materially to the knowledge of the varieties best adapted if they would graft good varieties on some of the seedling trees that bear comparatively worthless nuts. A number of varieties can, for experimental purposes, be grafted or budded onto a single tree. Wood grafted onto mature trees should start bearing within 2 or 3 years, whereas it will require from 5 to 10 years for newly planted trees to bear. Some of the papershell varieties suggested as worthy of trial are: Halbert, San Saba Improved, and Western Schley. In addition to these varieties, the New Mexico station suggests Stuart and Squirrel's Delight for the southeastern part of that State.

Anyone acquainted with trees bearing nuts of high quality, and especially nuts that ripen well before frost, should bring them to the attention of an experiment station, the United States Department of Agriculture, and nurserymen. Some such tree may prove of the utmost value from which to propagate.

Except in the area where cotton is successfully grown, an attempt to grow the southern papershell varieties of pecans is likely to be a waste of time. North of the cotton-growing area but still on the bottom lands, or under irrigation, some of the so-called northern varieties, such as Major, Busseron, Posey, Indiana, and Greenriver, are suggested for trial on a limited scale.

### BLACK WALNUTS

In recent years many selections of black walnuts have been made in various parts of the United States. The nuts from the selected seedlings have thinner shells and larger kernels, and shell more easily than those from the ordinary seedlings.

Black walnuts may be expected to come into bearing within 5 to 10 years, depending on the variety, the vigor of the tree, and the conditions under which it grows. Established young black walnut trees may be grafted with improved varieties, with the expectation that some will yield nuts in 2 or 3 years.

Black walnuts should be irrigated, or grown on subirrigated land, to be successful. Trees have made fairly satisfactory early growth on high land when cultivated but have been so short-lived that the

planting of them on such land is not recommended. The improved varieties offer distinct promise as a nut crop of value, at least for home use, when planted on the proper sites.

The Thomas, Ohio, and Meyers varieties are suggested for trial. They should be propagated on rootstocks of the eastern black walnut (*Juglans nigra*). They do not grow satisfactorily on rootstocks of the various western walnuts.

## OTHER BULLETINS ON GROWING FRUITS AND NUTS

The following publications of the U. S. Department of Agriculture may be obtained from your local county agricultural agent or by writing to the Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C. Order by number.

### FARMERS' BULLETINS

685—The Native Persimmon.
887—Raspberry Culture.
1027—Strawberry Growing in the Western United States.
1501—Nut-Tree Propagation.
1522—The Home Fruit Garden on the Northern Great Plains.
1870—Pruning Hardy Fruit Trees.
1943—Strawberry Varieties in the United States.
1995—Growing Erect and Trailing Blackberries.
2021—Growing Peaches East of the Rocky Mountains.



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